Breath-hold magnetic resonance imaging in comparison with endoscopic ultrasonography for the evaluation of abnormalities of the gallbladder

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Introduction:
Evaluations of the pathology of the gallbladder (GB) have been made with ultrasonography and endoscopic ultrasonography (EUS). With development of the MR technique, fast imaging technique can be effectively utilized for the evaluations of small structures such as GB. Especially, a half Fourier type of single shot fast spin echo (SSFSE or HASTE) T2 weighted images can improve the lesion detection in the GB. Dynamic contrast three dimensional fast spoiled gradient echo technique (3D FSPGR) can be useful for the evaluations of the vascularity of the lesions. Accordingly, the purpose of the current study was to assess breath-hold Magnetic resonance imaging (MRI) in comparison with endoscopic ultrasonography (EUS) for the evaluation of abnormalities of the gallbladder (GB).

Subjects and Methods:
Thirty-two patients preoperatively underwent MR imaging and EUS. MR imaging (MRI) was performed on 1.5 Tesla magnet (Signa Horizon, GE medical systems, Milwaukee) with a phased-array multicoil. Basically, two different sequences were obtained; breath held SSFSE T2 weighted images in transverse and sagittal planes and dynamic contrast 3D FSPGR images in a sagittal plane. Breath holding maneuver was performed in an end expiratory. The imaging parameters for SSFSE were as follows; TR, infinite; TE, 90ms; slice thickness, 3-4mm, gapless, RBW, 62.5kHz; echo space, 5.4ms; FOV, 20-24cm; number of slices, 20 to 30; Matrix, 256x160. Dynamic contrast 3D FSPGR was performed with the following parameters; TR, 6.3ms; TE, 1.2ms; Flip angle, 30°; use of spectrally selected fat saturation; slice thickness, 3-4mm; RBW, 62.5kHz; FOV, 24x19-28x22cm; number of partitions, 20-26; Matrix, 256x160. Three sequential acquisitions were performed. In a bolus fashion, 0.1mmol/kg of Gd-DTPA (Magnevist, Schering AG, Germany) was manually injected through the cubital veins, followed by the flash of the 10ml saline.

EUS was performed jointly by two gastroenterologists in all patients.

Evaluations:
MRI was interpreted by two radiologists blinded to the results of EUS. Both SSFSE and 3DFSPGR images were postprocessed with multiplanar reformation (MPR) on an independent console. Direction of the Reconstructed images was freely manipulated with a trackball.

Gold standard:
Histopathological diagnoses after surgical resection were adenomyomatosis (n=12), GB cancer (n=4), chronic cholecystitis (n=10), polyp (n=4) and stone (n=2).

RESULTS:
Adenomyomatosis was accurately detected by MR in 11 patients (91.7%) with focal thickening of the wall and intramural T2 high intensity spots indicating Rokitansky-Aschoff sinuses (RAS). EUS (10/12, 83.3%) suggested it as numerous tiny intramural cysts with GB wall thickening. GB cancer was detected in 3 cases by MR, and in 4 by EUS with two false positive cases. Chronic cholecystitis was detected as GB wall thickening in MRI in 9 and EUS in 9 patients. The debris in the GB might cause false positive with EUS for GB cancer or polyp, which MR excluded because of absence or existence of contrast enhancement in three patients. The detectability of polyps was better in EUS (4/4) than MRI (3/4). MRI and EUS detected stone in two patients.

Conclusions:
Breath-hold MRI is accurate in demonstrating pathology of the GB such as adenomyomatosis, cholecystitis, GB cancer and stone with different types of contrast such as T2 and T1 with/without contrast medium. EUS is better for the detection of polyps.